

What is claimed is:

1. A cryogenic medical system comprising:

a medical device;

a console including accessories, the console connectable to the medical device at a connection point, the console controlling temperature of the medical device, and the console including

a first cooling system directing coolant to the medical device at a first temperature along a coolant supply line; and

a second cooling system chilling the coolant within the coolant supply line to a temperature below the first temperature before the coolant reaches the connection point.

2. The system of claim 1, wherein the medical device includes a catheter.

3. The system of claim 2, wherein the first cooling system includes a coolant return line leading from the medical device, and wherein the first cooling system and the medical device comprise a substantially closed-loop.

4. The system of claim 3, wherein the first cooling system includes:

a first compressor in fluid communication with a first condenser outputting coolant into the coolant supply line; and

a vacuum pump in fluid communication with the first compressor that establishes a pressure within the coolant return line that is below ambient atmospheric pressure.

5. The system of claim 3, wherein the second cooling system includes an enclosure having an inlet and an outlet; the enclosure defining a fluid path from the inlet to the outlet, and the enclosure enveloping a portion of the coolant supply line.

1 6. The system of claim 5, further comprising a second compressor in fluid
2 communication with a second condenser outputting coolant to the inlet of the enclosure
3 and receiving coolant from the outlet of the enclosure.

1 7. The system of claim 2, wherein the first cooling system includes a coolant return
2 line leading from the catheter to a coolant scavenging system, and wherein the first
3 cooling system and the catheter comprise a substantially open-loop.

1 8. The system of claim 7, wherein the first cooling system includes:
2 a coolant reservoir in fluid communication with the fluid supply line; and
3 a vacuum pump interposed between the catheter and the coolant collection tank.

1 9. The system of claim 8, wherein the vacuum pump creates a pressure within the
2 catheter that is below ambient atmospheric pressure.

1 10. The system of claim 7, wherein the second cooling system includes an enclosure
2 having an inlet and an outlet; the enclosure defining a fluid path from the inlet to the
3 outlet, and the enclosure enveloping a portion of the coolant supply line.

1 11. The system of claim 10, further comprising a compressor in fluid communication
2 with a condenser outputting coolant to the inlet of the enclosure and receiving coolant
3 from the outlet of the enclosure.

1 12. The system of claim 10, further comprising:
2 a coolant reservoir in fluid communication with the fluid supply line;
3 a second fluid supply line in fluid communication with the coolant reservoir and
4 the inlet of the enclosure.

1 13. The system of claim 12, further comprising:
2 a temperature sensor for measuring the temperature within the enclosure; and
3 a coolant flow regulator responsive to the temperature sensor for controlling fluid
4 flow from the second fluid supply line into the enclosure.

1 14. The system of claim 12, further comprising a temperature sensor for measuring
2 the temperature within the fluid supply line; and
3 a coolant flow regulator responsive to the temperature sensor for controlling fluid
4 flow from the second fluid supply line into the enclosure.

1 15. A cryogenic medical system comprising:

2 a catheter;

3 a console including accessories, the console connectable to the catheter at a
4 connection point, the console controlling temperature of the catheter, and the console
5 including

6 a first cooling system including

7 a coolant supply line leading to the catheter,

8 a coolant return line leading from the catheter,

9 a first compressor in fluid communication with a first condenser
10 outputting coolant into the coolant supply line, and

11 a vacuum pump in fluid communication with the first compressor
12 that establishes a pressure within the coolant return line that is below ambient
13 atmospheric pressure; and

14 a second cooling system including

15 an enclosure having an inlet and an outlet, wherein the enclosure
16 defines a fluid path from the inlet to the outlet, and the enclosure envelops a portion of
17 the coolant supply line of the first cooling system; and

18 a second compressor in fluid communication with a second
19 condenser outputting coolant to the inlet of the enclosure and receiving coolant from the
20 outlet of the enclosure.

1 16. A cryogenic medical system comprising:

2 a catheter;

3 a console including accessories, the console connectable to the catheter at a
4 connection point, the console controlling temperature of the catheter, and the console
5 including

6 a first cooling system including

7 a coolant supply line leading to the catheter,

8 a coolant return line leading from the catheter,

9 a coolant reservoir in fluid communication with the fluid supply
10 line,

11 a coolant collection tank in fluid communication with the coolant
12 return line, and

13 a vacuum pump interposed between the catheter and the coolant
14 collection tank that establishes a pressure within the coolant return line below ambient
15 atmospheric pressure; and

16 a second cooling system including

17 an enclosure having an inlet and an outlet, wherein the enclosure
18 defines a fluid path from the inlet to the outlet, and the enclosure envelops a portion of
19 the coolant supply line of the first cooling system; and

20 a second fluid supply line in fluid communication with the coolant
21 reservoir and the inlet of the enclosure.

1 17. A cryogenic medical system comprising:

2 a medical device;

3 a console including accessories, the connectable to the medical device at a
4 connection point, the console controlling temperature of the medical device, and the
5 console including

6 a first system directing coolant in a mixed gas and liquid state to the
7 medical device along a coolant supply line; and

8 a second system decreasing the percentage of gas in the coolant before the
9 coolant reaches the connection point.

1 18. The system of claim 17, wherein the second system decreases the percentage of
2 gas in the coolant by reducing the temperature of the coolant, and wherein the system
3 further comprises

4 an chamber having an inlet and an outlet, wherein the enclosure defines a fluid
5 path from the inlet to the outlet, and the enclosure envelops a portion of the coolant
6 supply line; and

7 a controller for controlling coolant flow into the chamber.

1 19. The system of claim 18, wherein the controller establishes a duty cycle for
2 cyclically allowing and denying entry of coolant into the chamber at a rate responsive to
3 sensed temperature within the chamber to selectively raise, lower, and maintain
4 temperature of coolant within the coolant supply line.